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ABSTRACT

Social epistemology is an effort to combine the philosophical theories of science that have stressed normative approaches to knowledge with sociological theories which are weak on offering guidance on how knowledge policy should be conducted. The practice of multiculturalism provides a useful application of social epistemological intervention, mainly because the phenomenon of "multiculturalism" escapes the usual philosophical and sociological ways of understanding knowledge. Multiculturalism is not to be confused with the mere recognizing of others' culture, but rather the infusing of the minor culture into the major culture. Problems arise when the major and minor cultures are fearful of any changes to the current modes of thinking and knowledge acquisition. It is noted that many cultures have quickly adapted and infused the Western views of science, bringing to light the importance of studying and practicing multiculturalism. Contains 14 references. (MVL)

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MULTICULTURALISM AND SCIENCE EDUCATION: A TEST CASE FOR SOCIAL EPISTEMOLOGY

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Philosophical theories of science have stressed normative approaches to knowledge without considering their empirical realizability or political consequences. Sociological theories have suffered the reverse problem of capturing the empirical and political character of knowledge, but without offering guidance on how knowledge policy should be conducted. 'Social epistemology' aims to consolidate the strengths and eliminate the weaknesses of these two approaches. Recent reports and debates concerning multiculturalism in the pages of Science Education provide a ripe opportunity for social epistemological intervention, mainly because the phenomenon of 'multiculturalism' escapes the usual philosophical and sociological ways of understanding knowledge.

Multiculturalism clearly denies the 'universalist' philosophical premise that knowledge is the same for all times and places. But less obviously, it also denies the relativist premise associated with the sociology of knowledge. For whereas a relativist argues that a particular form of knowledge is 'relative' to a specific time and place, multiculturalists typically argue that, say, African knowledges need to be introduced in American pedagogical settings. In other words, multiculturalism opposes the universalist-relativist dichotomy by arguing for an 'interpenetration' of knowledges. This interpenetration -- the subject of my latest book, Philosophy, Rhetoric and the End of Knowledge -- reflects the contemporary reality of mass communication and migration patterns that did not exist when the classical philosophical and sociological views were originally formulated.

In claiming that our main epistemological categories are inappropriate for understanding the multicultural world of knowledge production, let me stress two points, first an assumption and then an implication.

First, it is important not to assume that the universalist-relativism distinction made perfect sense from its classical Greek origins until the period when communication and migration patterns started to acquire their contemporary form. On the contrary, I would argue that the universalist-relativist distinction made sense only for a limited amount of time: from Britain's aggressive pursuit of a free trade policy in the 1780s to the end of colonialism in the 1960s. The idea of culture as something attached to a particular people who are, in turn, attached to a particular place -- the typical image of relativist knowledge production -- is a late 18th century German innovation, which emerged in reaction to the palpable disintegration of traditional forms of life by the spread of commercial values. Thus, one finds utilitarianism much demonized for reducing qualitative distinctions to a universal calculus of commensurable quantities. The reaction took the form of consolidating a unique cultural identity around the nation-state, mainly through uniform schooling and military service, two processes that did much to restrict people's natural cognitive and physical mobility. Prior to this period, universalism and relativism would not have been seen as incompatible. The ancient saying 'When in Rome, do as the Romans do' could have stood for either universalism or relativism, depending on what Rome's jurisdiction was taken to be. All that the saying implied was a respect for the customs already in place, not the size

of the place itself. The historical relevance of the universalism-relativism distinction ends with the second major round of nation-state building in Africa and Asia, during which similar arguments for cultural identity were made, this time in the face of Euro-American hegemonic tendencies.

Second, as long as epistemological arguments concerning multiculturalism resort to the universalism-relativism distinction, miscommunication is bound to ensue between multiculturalists and their critics. One commonly observed pattern of misunderstanding occurs when, say, a physical anthropologist who wants to test the Melanin Hypothesis (i.e. that Africans have special psychic powers by virtue of their skin pigmentation) is told that Western positivist methods cannot access the Melanin-based knowledge. Sometimes defenders of Melanin even maintain that such knowledge is accessible only to Africans. At an obvious level, this radically relativist response is extreme. But at a deeper level, it retreats from the original mandate of multiculturalism to challenge Western forms of knowledge, since it simply asserts the autonomy of Melanin-based knowledge from anything Westerners can know: 'You have your knowledge, we have ours' seems to be the bottom line. While such assertions of autonomy play an important role in constructing a voice for traditionally suppressed groups, to tie one's academic politics exclusively to the maintenance of this voice is to invite a familiar pattern of university cooptation: namely, a Centre for Melanin Studies that coexists peacefully with all the other departments, which themselves remain unchanged. Thus, it is important that multiculturalists insist not only, or even primarily, that they possess radically autonomous forms of knowledge. Rather, they should push the 'standpoint' line that the West's neglect of their epistemic perspective reflects a substantial flaw in the West's own mode of knowledge production.

This is not a trivial shift in argument. In much of the education literature -- but especially in science education -- the defense of multiculturalism has been pitched in terms of enabling cultural minorities to develop their own voices in the classroom. What has not been stressed is the role that multiculturalism can play in re-educating cultural majorities, perhaps causing them to change their fundamental beliefs, even about a form of knowledge as seemingly universal as natural science. Ironically, the idea that natural science is the signature cultural product of the West was itself born of this sort of rethinking. Concerted inquiry into why the 'Leap of Thales' or the 'Scientific Revolution' took place in the West rather than the East is only about a century old, coinciding with the ascendency of Japan to the status of world power. The West had learned a lot about what was 'universal' in its forms of knowledge from the East wanted for its own purposes. The ease with which the Japanese became 'Westernized' unleashed anxiety on the part of Westerners who wondered whether it was merely an accident that natural science developed first in the West rather than the East. The perceived decline in Islamic scientific culture from its dominance in the Middle Ages to the decadent days of the Ottoman Empire stood as a warning to late 19th century Europeans that the course of scientific progress was indeed reversible. The field 'history of science' arose in this context, as a way of presenting science as the dominant cultural achievement of the West. Thus began the elusive search for what was so unique about the Western cultural environment.

In fact, the history of Western thought is filled with episodes in which multicultural encounters have caused Westerners to rethink fundamentally their orientation to knowledge. In what follows, I will review some of these, and argue that

in order for future multicultural encounters to cause similar rethinkings, the association of a culture and a particular form of knowledge must be seen as 'contingent' rather than 'necessary'. Although many non-Western ethnocentrists (e.g. Afrocentrists) nowadays claim a necessary relationship between a cultural setting and a form of knowledge, I argue that this is neither true to the history of these forms of knowledge, nor especially helpful in enabling Westerners to learn from them.

Here we need to refurbish the idea of 'standpoint theory'. In both Marxist and feminist literatures, stress is usually placed on the theory's critical rather than on its constructive epistemological function. In the original standpoint theory, Georg Lukacs sought a privileged role for the proletariat in identifying the shortcomings of bourgeois consciousness. Being marginalized from the means of production, the workers possessed the sort of 'relative objectivity' that comes from not having a vested interest in reproducing the status quo. However, a complementary way of understanding the epistemic power of such a standpoint is in terms of what economic historians following Alexander Gerschenkron call 'the relative advantage of backwardness'. The proletariat's backward status is to their advantage because while not involved in the original design of the dominant social order, they nevertheless have had an opportunity to observe its operation. Thus, once provided the chance of constructing their own regime, what they regard as the 'wheat' and the 'chaff' of the old order will turn out to be the grounds for differentiating, respectively, material infrastructure and ideological superstructure. For example, whereas it is to the advantage of Westerners to claim that the current structure of scientific disciplines is necessary for 'understanding' the technology one uses, the multicultural standpoint will treat 'science' in this context as a mechanism for ideologically containing the uses made of the technology so as to disturb as little as possible the Western power structure.

This ideological containment can happen quite subtly. One important way is by requiring that Third World peoples (or women and ethnic minorities in First World countries) undergo an elaborate and comprehensive scientific curriculum before being given access to relevant technological knowledge. Such a curriculum is tantamount to mandated cultural assimilation. At the very least, it forces these people to traverse the stages by which Westerners have come to have the technological knowledge in question, as if that were the only way it could be acquired. This strategy is repeated at the level of epistemology, most blatantly, in Piaget's theory of cognitive development, according to which the stages through which individuals pass recapitulate those of the history of Western science. A more subtle version is Thomas Kuhn's 'non-teleological' account of scientific growth, which accepts the functional differentiation of the scientific disciplines from the 17th to the 20th centuries as a model of 'progress from' rather than 'progress to'. Once again, the presumption is that there is an internal logic to scientific change which requires a repetition of the Western pattern, even though Kuhn grants that a goal cannot be specified to explain the direction of this change.

It would be interesting to see just how many Third World academic leaders have shared enough of this mentality to want their universities to reproduce the departmental structure of First World institutions. In contrast, a strategy more in line with the standpoint we've attributed to multiculturalism would be to organize Third World universities according to disciplines that cross-cut the domains of the Western scientific disciplines. Such extant fields as rice science (Philippines), rubber science (Malaysia), and tropical science (Costa Rica) do just that, using a 'spatial' rather than a 'temporal'

principle (if one imagines the functional differentiation of disciplines as a stylized version of the history of Western science) for identifying realms of knowledge.

As we begin our brief historcal investigation, let us pose the question very bluntly: Suppose that we accept that the natural sciences produce a 'universal' form of knowledge. How could the West have come to discover such a thing in its history? After all, modern natural science, with its dual emphasis on experimental testing and mathematical calculation, did not emerge in many places at once, but only from some rather special developments in seventeenth century Northwest Europe.

Moreover, these developments did not happen overnight, largely for reasons that we would now consider ethnocentric, if not downright xenophobic. The most universalist of universal claims about science -- that even God is bound by the laws of nature -- first reached Europe as a Muslim idea that was seen as threatening to the omnipotence of God and, by extension, the absolute authority of his Roman Catholic mediators. This culminated in the Condemnation of 1277, which effectively drove out Muslim sympathizers from the University of Paris. (Had the decree been issued just a few years earlier, Thomas Aquinas might have been himself expelled for his interest in synthesizing the Islamically favored Aristotle with the more Platonically oriented Church doctrine.) These "Averroists," named after the leading Muslim philosopher, fled to Northern Italy, where they spent the next three centuries training most of the scientific leaders of the Renaissance, especially Galileo. Pierre Duhem famously identified 1277 as the birth of modern science. Once the Averroists had been divested of their theological duties, they were able to pursue natural inquiry in a secular setting, albeit in exile. But what makes this episode even more interesting is that the Averroists were able to flourish as a heretical school at all and for so long. Obviously, this testifies to the resilience of the university, which, less obviously, reflects the "relative advantage of backwardness" that the West enjoyed over Islam during the late Middle Ages.

Built as it was on arid land, Muslim civilization was held together by state-supported irrigation projects, whose construction and maintenance required the coordination of vast networks of technical workers. Because advances in science were thus readily seen as advances in statecraft, a considerable investment was made in developing the madaris, the first residential colleges. However, the fates of these colleges were tied to the fortunes of their political patrons. Islamic Law did not guarantee the colleges the corporate autonomy that would enable their inquiries to continue in perpetuity. That idea -- the university -- was a Western innovation, one born of the disorganization of feudal Europe, where rulers were often more than happy to grant autonomy to self-constituting groups that agreed to abide by minimal standards of political loyalty.

It was still a long way from establishing institutions of pure inquiry to legitimating the natural sciences as we know them today. A decisive point, however, was that, under Roman law, the category of universitas covered not only (or even primarily) institutions of higher learning but also craft and trade guilds. This equality of legal status enabled a kind of commerce between "scholars" and "artisans" in the cities that had not existed in the great civilizations of the East, where often the two classes were strictly segregated from each other. Of course, Western intellectuals of the period can be found complaining that this intermingling of the classes was symptomatic of social disorder. Nevertheless, as Joseph Needham and others have observed, the distinctive feature of the Scientific Revolution in the West -- that speculative hypotheses are tested by technological means -- depended precisely on the mutual respect that equal status bred.

Even then, another two centuries had to pass before the natural sciences were fully accepted as part of university culture. The following qualms remained: Did the new science extend or refute Christianity? Was it suitable for university instruction or merely an avocation of gentlemen? Did substantial investment in science make an appreciable difference to material progress or did it merely rationalize discoveries that could have been made without knowledge of science? Lingering prejudices toward science's heavy reliance on experimental apparatus ensured that, until about a hundred years, the great "scientists" who held academic posts all their lives -- say, Newton or Maxwell -- would have to be accredited in a liberal arts subject like philosophy or mathematics.

Perusing the various schemes of historical progress put forth in the nineteenth century, one finds that the superiority of the natural sciences was more often attributed to the superiority of the West than vice versa. One would be hard-pressed to find a Hegel, Comte, or Spencer argue that the natural sciences could just as easily flourish in the East as in the West. In short, until the end of the last century, Westerners generally treated the natural sciences as an accomplishment peculiar to their own culture -- one, even when held in highest esteem, that was regarded as uniquely Western. So, when did all this unabashed ethnocentrism come to an end, ushering in the modern era of scientific universalism?

The answer lies in the first voluntary and successful appropriation of the natural sciences by a non-Western country, Japan, which over the period 1870-1900 became one of the six leading military and industrial powers in the world. The force of this achievement was driven home by Russia's 1905 defeat at the hands of Japan, widely advertised at the time as the first non-Western victory over a Western nation. Had the Japanese beaten the Westerners at their own game? I would urge an even stronger conclusion, namely, that it wasn't clear what "the game" was until Japan took to the field. Western merchants and diplomats, who had for years tried to sell all manner of things to the Far East, were surprised at how the Japanese eagerly sought training in European chemistry and physics but showed little interest in acquiring such classical status markers of "civilization" as knowledge of fine art, philosophy, and literature. Here, too, the relative advantage of backwardness played an important role. It may seem that Japan suffered by having been isolated from the previous 2500 years of Western history. However, it overcame this deficit by codifying natural scientific knowledge in an ideographic script that enabled Japanese students to bypass that history and to absorb the scientific content directly. Western students, by contrast, were perennially reminded of their past as they struggled to decipher the Greco-Roman roots of modern scientific terms. That the Japanese could match Western scientific and technical performance without having to master the classics of Western culture was the sort of surprise that defined for Westerners the sense in which the natural sciences were "universal."

Of course, Japan was not an isolated case. European imperialism had unwittingly prod uced other "standpoints." The emergence of colonial centers of scientific research, sometimes staffed primarily by assimilated non-Westerners, led humanists in the metropolitan powers to reconceptualize the "uniqueness" of Western science as a matter of contingency, as if it were only by accident that the natural sciences had emerged in Europe rather than, say, China, India, or Egypt. By posing the question of science as one of historical accident, rather than of historical necessity, "history of science" as a recognizable field of study came into its own. The force of this question was to suggest both that the natural sciences were within any culture's reach and that Europe's

domination of the globe was by no means guaranteed in perpetuity. In any event, it shifted scholarly interest from science as the reflection of more general European attitudes to science as a relatively autonomous and hence easily exportable enterprise. In the sociology of the day, science shifted from the category of "culture" to that of "civilization."

The moral of this story is that history does not arrive in a neat ontological package, with some bits labeled "necessary," "universal," or "true," and other bits labeled "accidental," "particular," or "false. Events happen in bundles, and only after some time has passed are they unraveled and labeled. This is the stuff of which historical narratives are made. And only through such retellings of the past do we come to have any strong sense of what the world obliges, forbids, and merely permits. These are the first lessons of a social constructivist epistemology. They help explain the great difficulty that philosophers and scientists have had in pinpointing the so-called realist core of science, namely, because that core has been nothing more (and nothing less) than those aspects of science that have held up well in cross-cultural translation. Now, however, with the advent of feminist and multiculturalist critiques of science from within our own culture, the balance of trade threatens to be upset again. What these groups end up including of current science in their hybridized research practices will in part determine what counts as the realist core of tomorrow's science.

It is worth emphasizing that nothing said here requires denying the obvious, namely, that we have managed to eliminate certain deadly diseases, that astronauts have flown in space, and that atomic bombs have caused untold damage. The bone of contention is over the explanation one gives for these achievements and, in some cases, the ultimate value one attributes to them. It is little more than secular superstition to suppose that Western science has some special explanatory purchase on widely used technologies, simply because its theories were the ones that first provided legitimacy for such technologies. Yet, the superstition lives on in the imaginations of those who would claim that a technological innovation 'implicitly instantiates' scientific principles that may not be discovered until years later.

Nevertheless, most historians today take it as uncontroversial that natural scientific theories played a relatively minor role in technological design until the late 19th century, at which time technology starts to be the product of large scale industrial processes. An important part of the charge of multiculturalism is to show how these technologies -- insofar as they deserve global diffusion -- can be explained and appropriated outside of the dominant cultural environments. Thus, among the real heroes of multiculturalism are the women and ethnic minorities who can appropriate cyberspace for their own purposes -- not those who refuse to engage with the new information technologies because they are seen as irrevocably tied to White male forms of knowledge. To make such a tight connection between science and technology, and between both of these and a particular culture, is to betray multiculturalism's potential for providing an emancipatory epistemological standpoint that transcends stale philosophical debates between universalism and relativism.

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